

RECLAMATION

Managing Water in the West

**Lower Colorado River
Multi-Species Conservation Program**

Cibola Valley Conservation Area Draft Report



**U.S. Department of the Interior
Bureau of Reclamation
Lower Colorado Region
Boulder City, Nevada**

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Cibola Valley Conservation Area Summary

Partners

Arizona Game and Fish Department
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Location

Cibola, La Paz County, Arizona; between River Miles 98.8 to 104.9

Purpose

Reclamation seeks Steering Committee preliminary consideration of a proposal to evaluate inclusion of 1,019 irrigable acres with associated habitat for LCR MSCP use.

Property Value

All included resources would be valued based on a Federally-approved appraisal.

Proposed Habitat Acres for Targeted Covered Species

Create a conservation area to provide an integrated mosaic of between 500 and 1,019 acres of native habitat for Covered Species including, but not limited to:

- ~250 to 500 acres cottonwood-willow I, II, III, and IV — targeting and managed for southwestern willow flycatcher and yellow-billed cuckoo, and may also benefit western red bat, western yellow bat, elf owl, gilded flicker, Gila woodpecker, vermilion flycatcher, Arizona Bell's vireo, Sonoran yellow warbler, and/or summer tanager;
- ~500 to 780 acres honey mesquite III — targeting western red bat, western yellow bat, elf owl, vermilion flycatcher, Arizona Bell's vireo, and/or MacNeill's sootywing skipper; and
- ~5 to 19 acres native vegetation, e.g., quailbush — targeting MacNeill's sootywing skipper, additional acres of quailbush and/or drought-tolerant vegetation may be planted to stabilize fallow fields.

* Actual habitat created (and credited) would depend on a number of factors, including availability of water supplies, success of irrigation treatments, planting and nursery effectiveness, and other relevant factors.

** As part of LCR MSCP implementation, Reclamation has previously agreed to prioritize creation of certain land cover types, including at least 1,048 acres of honey mesquite within the State of California.

Proposed Timeline for Habitat Creation

Phase I, FY06

Plant 22 acres of cottonwood-willow nursery
Plant 64 acres of cottonwood-willow habitat

Phase II, FY07

Plant 10 acres of mesquite nursery
Plant 70 acres of cottonwood-willow habitat

Phase III, FY08

Plant 75 acres of cottonwood-willow habitat
Plant 5 acres of native vegetation buffer
Plant 50 acres of honey mesquite

Future Phases

Additional phases would be developed, as appropriate

Potential Conservation Measures

AMM1, AMM3, AMM4, BEV11, CMM1, CMM2, ELOW1, ELOW2, GIFL1, GIFL2, GIWO1, GIWO2, MNSW2, MRM1, MRM2, SUTA1, VEFL1, WIFL1, WRBA1, WRBA2, WYBA1, WYBA3, YBCU1, and YWAR1

Applicable Fiscal Year 2006 Workplan Tasks

D9: System Monitoring and Research of Covered Bat Species
E5: Cibola Valley Conservation Area
F1: Vegetation Survival and Growth (Habitat Monitoring)
F2: Avian Use of Restoration Sites, and
F3: Small Mammal Colonization of Restoration Sites

Table of Contents

Cibola Valley Conservation Area Summary	ii
Acronyms and Abbreviations	vii
1.0 Introduction.....	1
Lower Colorado River Multi-Species Conservation Program.....	2
Purpose of this Document.....	2
Selection of Cibola Valley Conservation Area.....	3
Mitigation Credit.....	3
Proposed Habitat Acres for Targeted Covered Species.....	5
Conservation Measures.....	5
Resources.....	8
General Funding.....	8
Environmental and Cultural Resources Compliance	9
2.0 Development of Cibola Valley Conservation Area	9
Potential Approach.....	9
Site Assessment	10
Conceptual Design.....	10
Cottonwood-Willow	11
Honey Mesquite	11
Description of Phases.....	14
Phase I.....	14
Phase II.....	14
Phase III	15
Future Phases	15
Schedule.....	16
2001 Biological Opinion Commitment Obligation (subsumed by LCR MSCP) ..	16
Remaining LCR MSCP Commitment	17
3.0 Site Management Overview	17
Land Manager	17
Land Cover Type Habitat Management.....	18
Cottonwood-Willow	18
Honey Mesquite.....	19
Other Management Needs.....	19
4.0 Monitoring Plan Overview.....	21
Reference Conditions.....	21
Implementation and Effectiveness Monitoring Goals	22
Implementation Monitoring.....	22
Effectiveness Monitoring.....	22
Monitoring Analysis and Evaluation	23
Thresholds.....	23
Trigger Points.....	24
Resources	24
Pre-Restoration	24
Post-Restoration.....	26
Sampling Design.....	28

Data Collection and Analysis.....	28
Evaluation of Results and the Adaptive Management Program	29
5.0 Summary.....	30
6.0 References.....	31
References Cited	31
Personal Communications	33

Tables

Table 1. Potential Conservation Measures.....	6
Table 2. Potential Covered Species: Status, Conservation Measures, Land Cover Type, and Patch Size.....	7

Figures

Figure 1. Location of Cibola Valley Conservation Area.....	4
Figure 2. Conceptual Design.....	13
Figure 3. Adaptive Management Program.....	30

Acronyms and Abbreviations

AGFD	Arizona Game and Fish Department
AMMs	Avoidance and Minimization Measures
BACI	Before-After-Control-Impact
CMMs	Conservation Area Management Measures
CVIDD	Cibola Valley Irrigation and Drainage District
CVCA	Cibola Valley Conservation Area
HCP	LCR MSCP Habitat Conservation Plan
LCR	Lower Colorado River
LCR MSCP	Lower Colorado River Multi-Species Conservation Program
LCR MSCP HCP	Lower Colorado River Multi-Species Conservation Program Habitat Conservation Plan (LCR MSCP 2004b)
MCWA	Mohave County Water Authority
MRMs	Monitoring and Research Measures
Reclamation	U.S. Bureau of Reclamation

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1.0 Introduction

Lower Colorado River Multi-Species Conservation Program

The Lower Colorado River Multi-Species Conservation Program (LCR MSCP) is a multi-stakeholder Federal and non-Federal partnership responding to the need to balance the use of lower Colorado River (LCR) water resources and the conservation of native species and their habitats in compliance with the Endangered Species Act. This conservation area is a potential component for implementation of the LCR MSCP, for which the Bureau of Reclamation (Reclamation) is the implementing entity. A Steering Committee (Steering Committee) provides input and oversight functions to support Reclamation's implementation of the program. The environmental impacts of implementation were programmatically addressed in the *Lower Colorado River Multi-Species Conservation Program: Volume I: Environmental Impact Statement/Environmental Impact Report* (LCR MSCP 2004a).

That document and the following five documents are hereby incorporated by reference, as appropriate for the Steering Committee's consideration: the *Lower Colorado River Multi-Species Conservation Program: Volume II: Habitat Conservation Program* (HCP) (LCR MSCP 2004b), *Volume III: Biological Assessment* (LCR MSCP 2004c), *Volume IV: Appendices to Volumes I-III and V* (LCR MSCP 2004d), *Volume V: Responses to Comments on LCR MSCP Volumes I-IV* (LCR MSCP 2004e), and *Funding and Management Agreement* (LCR MSCP 2005).

Purpose of this Document

This report is intended to serve as:

- A briefing document for the Steering Committee, and
- A preliminary planning document for Reclamation.¹

The document provides a general overview of the Cibola Valley Conservation Area (CVCA) habitat restoration, management, and monitoring plan strategies. To the extent that subsequent phases of the CVCA would be planned, phase-specific plans would be developed. This allows for the integration of the Adaptive Management Program (AMP).

¹ At the time of preparation of this planning document, Reclamation has not made any final decisions regarding the potential inclusion of the CVCA as a habitat conservation area within the LCR MSCP.

Selection of Cibola Valley Conservation Area

The CVCA is located in Arizona between River Miles 98.8 and 104.9, as presented in Figure 1. A number of factors were considered in the decision to consider this site as a conservation area. Those factors included, but were not limited to:

- Certain areas of the site provide soil textures that will hold moisture, which is necessary to establish the cottonwood-willow land cover type habitat with moist soils preferred by the southwestern willow flycatcher;
- The lands are in active agriculture and offer a cost- and time-efficient site to accomplish the 2001 Biological Opinion obligations that were subsumed by the LCR MSCP (LCR MSCP 2004b, Reclamation 2005b); and
- A number of LCR MSCP partners have worked to insure that the CVCA is considered for implementation of the LCR MSCP (see discussion in section heading “Resources” in section 1.0 *infra*).

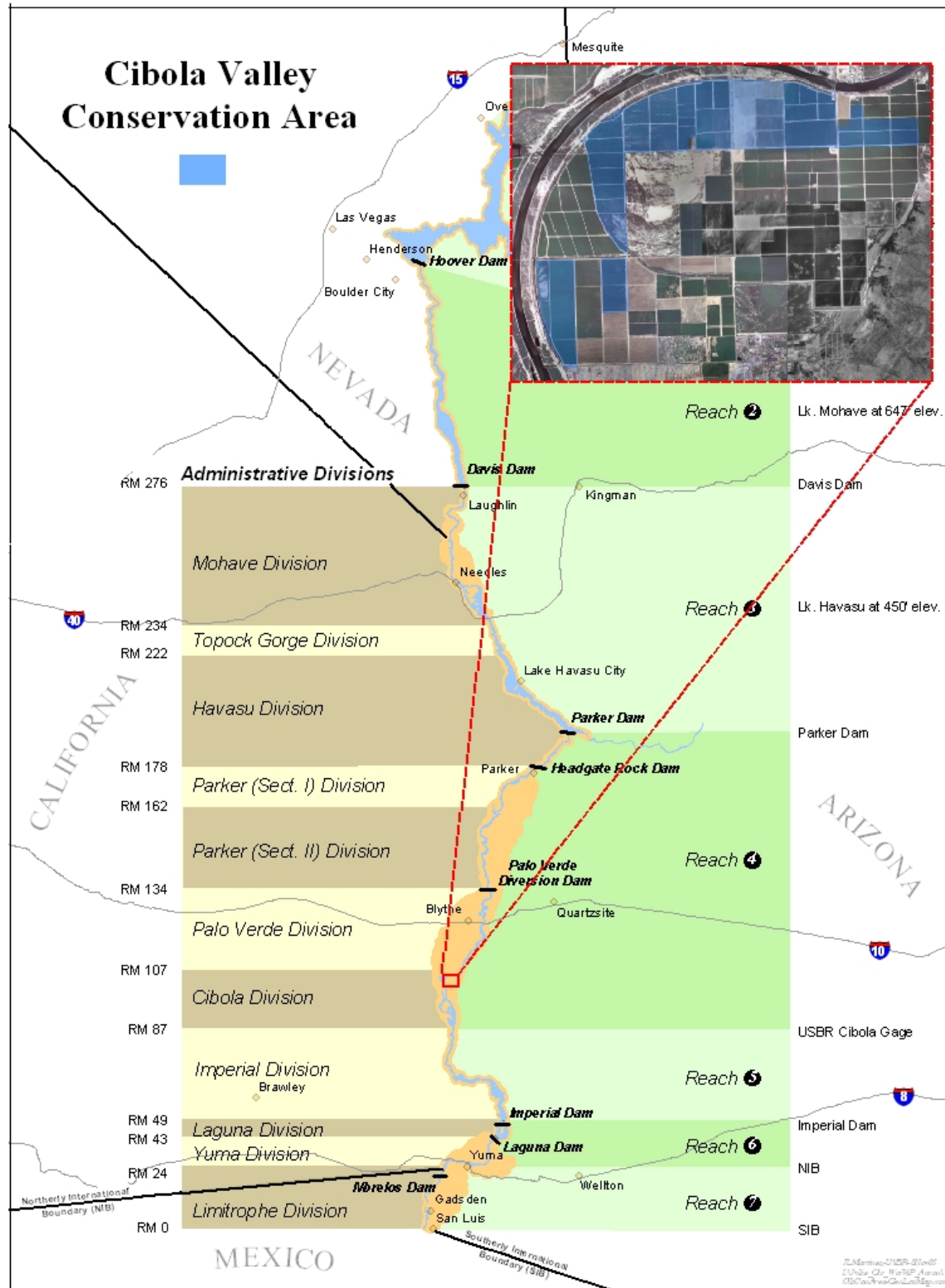
Mitigation Credit

It is intended that the potential cottonwood-willow land cover type established on CVCA would provide habitat for the southwestern willow flycatcher, in accordance with the 2001 Biological Opinion obligations that were subsumed by the LCR MSCP (LCR MSCP 2004b). An estimated 200 acres of cottonwood-willow I, II, III, and IV could be created and managed for the habitat conditions preferred by the southwestern willow flycatcher; e.g., moist soils, early seral stages.

The amounts of honey mesquite and additional cottonwood-willow to be created for other targeted Covered Species would be evaluated in the context of the overall obligations of the LCR MSCP.

Any acreage that is not restored with cottonwood-willow or honey mesquite would be planted to provide cost-effective stabilization of fallow fields.

Figure 1. Location of Cibola Valley Conservation Area



Proposed Habitat Acres for Targeted Covered Species

It is estimated the CVCA could contribute between 500 and 1,019 total acres of habitat towards the LCR MSCP obligation², as follows:

- ~250 to 500 acres cottonwood-willow I, II, III, and IV — targeting and managed for southwestern willow flycatcher and yellow-billed cuckoo, and which may also benefit western red bat, western yellow bat, elf owl, gilded flicker, Gila woodpecker, vermilion flycatcher, Arizona Bell's vireo, Sonoran yellow warbler, and/or summer tanager;
- ~500 to 780 acres honey mesquite III³ — targeting western red bat, western yellow bat, elf owl, vermilion flycatcher, Arizona Bell's vireo, and/or MacNeill's sootywing skipper; and
- ~5 to 19 acres native vegetation, e.g., quailbush — targeting MacNeill's sootywing skipper. Additional acres of quailbush and/or drought-tolerant vegetation may be planted to stabilize fallow fields.

Conservation Measures

The HCP describes numerous Avoidance and Minimization Measures (AMMs), Conservation Area Management Measures (CMMs), Monitoring and Research Measures (MRMs), and General and Species-Specific Conservation Measures designed to ensure the successful implementation of the LCR MSCP. The Conservation Measures that may apply to the CVCA are summarized in Table 1. The full text of each Conservation Measure can be found in the HCP (LCR MSCP 2004b). Please note that acreages specified in Table 1 apply to the entire LCR MSCP, not just CVCA.

The potential Covered Species status, Species-Specific Conservation Measures, land cover types, and patch sizes are summarized in Table 2.

² Actual habitat created (and credited) will depend on an number of factors, including availability of water supplies, success of irrigation treatments, planting and nursery effectiveness, and other relevant factors.

³ As part of LCR MSCP implementation, Reclamation has previously agreed to prioritize creation of certain land cover types, including at least 1,048 acres of honey mesquite within the State of California.

Table 1. Potential Conservation Measures

Number	Conservation Measure
AMM1	To the extent practicable, avoid and minimize impacts of implementing the LCR MSCP on existing Covered Species habitats
AMM3	To the extent practicable, avoid and minimize disturbance of covered bird species during the breeding season
AMM4	Minimize contaminant loads in runoff and return irrigation flows from LCR MSCP-created habitats to the LCR
BEVI1	Create 2,983 acres of Arizona Bell's vireo habitat
CMM1	Reduce risk of loss of created habitat to wildfire
CMM2	Replace created habitat affected by wildfire
ELOW1	Create 1,784 acres of elf owl habitat
ELOW2	Install elf owl nest boxes
GIFL1	Create 4,050 acres of gilded flicker habitat
GIFL2	Install artificial snags to provide gilded flicker nest sites
GIWO1	Create 1,702 acres of Gila woodpecker habitat
GIWO2	Install artificial snags to provide Gila woodpecker nest sites
MNSW2	Create at least 222 acres of MacNeill's sootywing skipper habitat
MRM1	Conduct surveys and research to better identify Covered and Evaluation Species habitat requirements
MRM2	Monitor and adaptively manage created Covered and Evaluation Species habitats
SUTA1	Create 602 acres of summer tanager habitat
VEFL1	Create 5,208 acres of vermilion flycatcher habitat
WIFL1	Create 4,050 acres of southwestern willow flycatcher habitat
WRBA1	Conduct surveys to determine the distribution of the western red bat
WRBA2	Create 765 acres of western red bat roosting habitat
WYBA1	Conduct surveys to determine the distribution of the western yellow bat
WYBA3	Create 765 acres of western yellow bat roosting habitat
YBCU1	Create 4,050 acres of yellow-billed cuckoo habitat
YWAR1	Create 4,050 acres of Sonoran yellow warbler habitat

Table 2. Potential Covered Species: Status, Conservation Measures, Land Cover Type, and Patch Size

Species Name	Federal Status ^a	Arizona Status ^b	Conservation Measure	Land Cover Type	Patch Size ^c	HCP Section ^d
Southwestern willow flycatcher <i>Empidonax trailii extimus</i>	FE	ASC	WIFL1	CW I, II, III, IV	10	5.7.2
Western red bat <i>Lasiurus blossevillii</i>	-	ASC	WRBA1 WRBA2	CW I, II HM III	-	5.7.7
Western yellow bat <i>Lasiurus xanthinus</i>	-	ASC	WYBA1 WYBA3	CW I, II HM III	-	5.7.8
Yellow-billed cuckoo <i>Coccyzus americanus occidentalis</i>	FC	ASC	YBCU1	CW I, II, III	25	5.7.14
Elf owl <i>Micrathene whitneyi</i>	-	-	ELOW1 ELOW2	CW I, II HM III	10-50 250	5.7.15
Gilded flicker <i>Colaptes chrysoides</i>	-	-	GIFL1 GIFL2	CW I, II, III	25	5.7.16
Gila woodpecker <i>Melanerpes uropygialis</i>	-	-	GIWO1 GIWO2	CW I, II, III, IV	50	5.7.17
Vermilion flycatcher <i>Pyrocephalus rubinus</i>	-	-	VEFL1	CW I, II, III, IV HM III	10-50	5.7.18
Arizona Bell's vireo <i>Vireo bellii arizonae</i>	-	-	BEVI1	CW III, IV HM III	-	5.7.19
Sonoran yellow warbler <i>Dendroica petechia sonorana</i>	-	-	YWAR1	CW I, II, III, IV	10	5.7.20
Summer tanager <i>Piranga rubra</i>	-	-	SUTA1	CW I, II	10-25	5.7.21
MacNeill's sootywing skipper <i>Pholisora graciellae</i>	-	-	MNSW2	HM III quailbush	-	5.7.25

^a Federal Status

FE = Listed as endangered under the Federal Endangered Species Act ESA

FT = Listed as threatened under ESA

FC = Candidate for listing under ESA

^b Arizona Status

ASC = Arizona wildlife of special concern

^c Minimum or suggested patch size in acres

^d Lower Colorado River Multi-Species Conservation Program: Habitat Conservation Plan (LCR MSCP 2004b)

A variety of habitat management methods may be employed to achieve the conservation measures. The results of each method would be monitored and analyzed as part of the AMP. This provides a flexible approach to evaluate and address anticipated and unanticipated results and adjust future methods accordingly. As each habitat creation phase is designed, phase-specific management and monitoring plans would be developed.

Resources

A program with the scope of the LCR MSCP will achieve the greatest success with the cooperation of partners. Site-appropriate partnerships will be formalized through agreements; e.g., memorandum of understanding, land use agreement, lease agreement. Prior to the LCR MSCP, Reclamation worked with partners for several years to begin to gather information necessary to fully evaluate consideration of individual locations for program-specific habitat creation purposes.

It is anticipated that the 1,019-acre⁴ CVCA could ultimately utilize up to 3,000 acre-feet of water for irrigation of a nursery and plants and trees. The initial partnership for this conservation area includes Reclamation, Mohave County Water Authority (MCWA), and Arizona Game and Fish Department (AGFD).

MCWA currently holds title to the land and has reserved it for LCR MSCP purposes. MCWA intends to donate the land for an in-kind credit. In addition, the Hopi Tribe has reserved an option for 1,500 acre-feet of water for the LCR MSCP. At this time, it is anticipated that this option could be exercised sometime in the future based on a habitat development schedule and available funding.

These resources would be valued based on a Federally-approved appraisal.

General Funding

The LCR MSCP is jointly funded between the States of Arizona, California, and Nevada; water and power entities in these States; and the Federal Government on a 50/50 basis. As described in the annual workplans prepared by Reclamation and reviewed by the Steering Committee, the LCR MSCP provides annual funding for development, management, and operational activities, including any potential activities at CVCA (LCR MSCP 2005).

⁴ The deeded acreage is 1,309.10 acres. However, the acreage used for this document is irrigable acres that have the potential to yield habitat. Non-irrigable acreage is not included; e.g., roads, irrigation infrastructure, berms.

Environmental and Cultural Resources Compliance

The LCR MSCP provides initial programmatic environmental and cultural resources compliance coverage. A CVCA site-specific categorical exclusion for Phase I, Cat. Ex. No. LC-05-016, was completed on April 28, 2005. Further environmental compliance would be completed, as appropriate, to the extent there would be additional activities involving the CVCA.

From June 20 through 29, 2005, a crew of archaeologists conducted a Class III Pedestrian Survey on the entire CVCA acreage. A number of prehistoric and historic isolated artifacts were identified and recorded. These included two small prehistoric chert core fragments, one 1939 Oliver Model 70 Wide Front tractor, and one historical-period 10-by-10 foot cobble irrigation feature. Local residents indicated that the irrigation feature was likely used until the 1950s when the new irrigation infrastructure was built. None of the cultural resources finds were significant enough to warrant site designation.

2.0 Development of Cibola Valley Conservation Area

Successful creation of cottonwood-willow and honey mesquite land cover types requires an attempt to mimic the physical processes that determine habitat structure and dynamics in riparian systems. Many site-specific factors were considered to provide an initial estimate of potential acreages of cottonwood-willow and honey mesquite land cover type habitats that may be achieved on this site; e.g., hydrology, soils, existing vegetation, depth to groundwater, environmental constraints, past and present land use, long-term management constraints, cost-effectiveness. Site-specific constraints were also taken into consideration, including, but not limited to, the amount of consistently available water to irrigate the site, historic river meander soil conditions, the development of buffers, and future directly adjacent development; i.e., a planned and approved 72-unit housing development and the proposed Cibola Mutual Water Company water treatment facility.

Potential Approach

CVCA would be planted in phases in varying compositions and densities of trees and managed to different year cohorts and seral stages. Flood irrigation would be used to saturate the soils at the appropriate times of the year to leach the salts through the soil column and provide favorable conditions for natural regeneration. The cottonwood-willow land cover type would be further saturated to provide moist soil conditions for prey insect production. Covered Species habitat would be established with the phased creation of each land cover type (see discussion in section heading “Description of Phases” in section 2.0 *infra*).

Monitoring results and AMP findings and recommendations of each implemented phase would guide the development, implementation, management, and monitoring of future phases. That data would also guide development on other LCR MSCP conservation areas.

Site Assessment

In 2002, Reclamation prepared an evaluation of the riparian restoration potential of the Cibola Valley Irrigation and Drainage District (CVIDD), a project study area of about 3,800 acres. In December 2004, MCWA and the Hopi each purchased a portion of the Cibola Valley from CVIDD. The *Cibola Valley Conservation Area Initial Site Assessment* was completed in February 2005 (Reclamation 2005a). That report provided a site assessment of the potential conversion of MCWA agricultural lands to native riparian habitat for the purposes of the LCR MSCP. The site assessment examined topics including existing site conditions; e.g., soils and water quality analysis; proposed land cover types, selected Covered Species requirements, cultural resources, site history, cropping history, pesticide use, and hazardous materials.

The site assessment found that the site has been in active production since the 1950s. A remnant river meander in the middle of the site presents the most coarse soil textures and has the potential to support honey mesquite land cover type. Other areas present finer soil textures and have the potential to support cottonwood-willow land cover type and moist soils. The irrigation infrastructure operated and maintained by CVIDD was in good condition. MCWA-owned lands are distributed in a way that would enable easily-designed buffers to separate Covered Species habitat from agricultural fields and future development; i.e., a planned and approved 72-unit housing development and the proposed Cibola Mutual Water Company water treatment plant. The water quality was found to be in an acceptable range. No significant cultural resources or hazardous materials concerns were identified.

Conceptual Design

As presented in Figure 2, the conceptual design for the CVCA provides an overview of a potential range of total acreages proposed to be accomplished on CVCA that would create a dynamic plant community that would support multiple layers, seral stages, and cohorts of trees. Based on the initial site assessment, the site conditions determined that the development of marsh land cover type and backwaters was not feasible. Cottonwood-willow and honey mesquite land cover types appeared to be suited to habitat creation on the site. A number of land cover type design elements were then considered (section 5.4.3.1, LCR MSCP 2004b; section 3(c)(ii), CDFG 2005). The elements considered include, but were not limited to:

Cottonwood-Willow

- Create large blocks of cottonwood-willow forest necessary to provide southwestern willow flycatcher and other Covered Species habitats;
- Create canals and/or shallow swales that dissect blocks of created forest to provide water and forest-edge conditions necessary to support southwestern willow flycatcher habitat;
- Create the microrelief and soil moisture conditions necessary to support a diversity of understory plant species, and distribute irrigation water;
- Actively manage created forest to maintain the seral stages preferred by targeted Covered Species;
- Irrigate to establish planted cottonwood-willow;
- Limit establishment of saltcedar and other nonnative species to maintain habitat quality for associated Covered Species;
- Periodic irrigation, when necessary, to prevent the buildup of salts in the soil;
- Follow minimum and maximum patch size criteria;
- Locate patches close to each other or to existing tracts of riparian forest and situated in a manner that would maximize continuity with other riparian land cover types;
- Create nesting habitat within 200 feet of standing or slow-moving water or moist surface soils supporting suitable insect-productive foraging habitat;
- Include provisions for supporting moist surface soils and standing or slow-moving water preferred by targeted Covered Species within their territories during the breeding season;
- Create canals and/or shallow swales to dissect blocks of restored cottonwood-willow that will be wide enough, e.g., estimated to be at least 25 feet, to create interior forest-edge conditions; and/or
- Mounds and depressions may be created to the extent necessary to establish some topographic diversity that will also provide habitat diversity by increasing plant and insect prey species diversity.

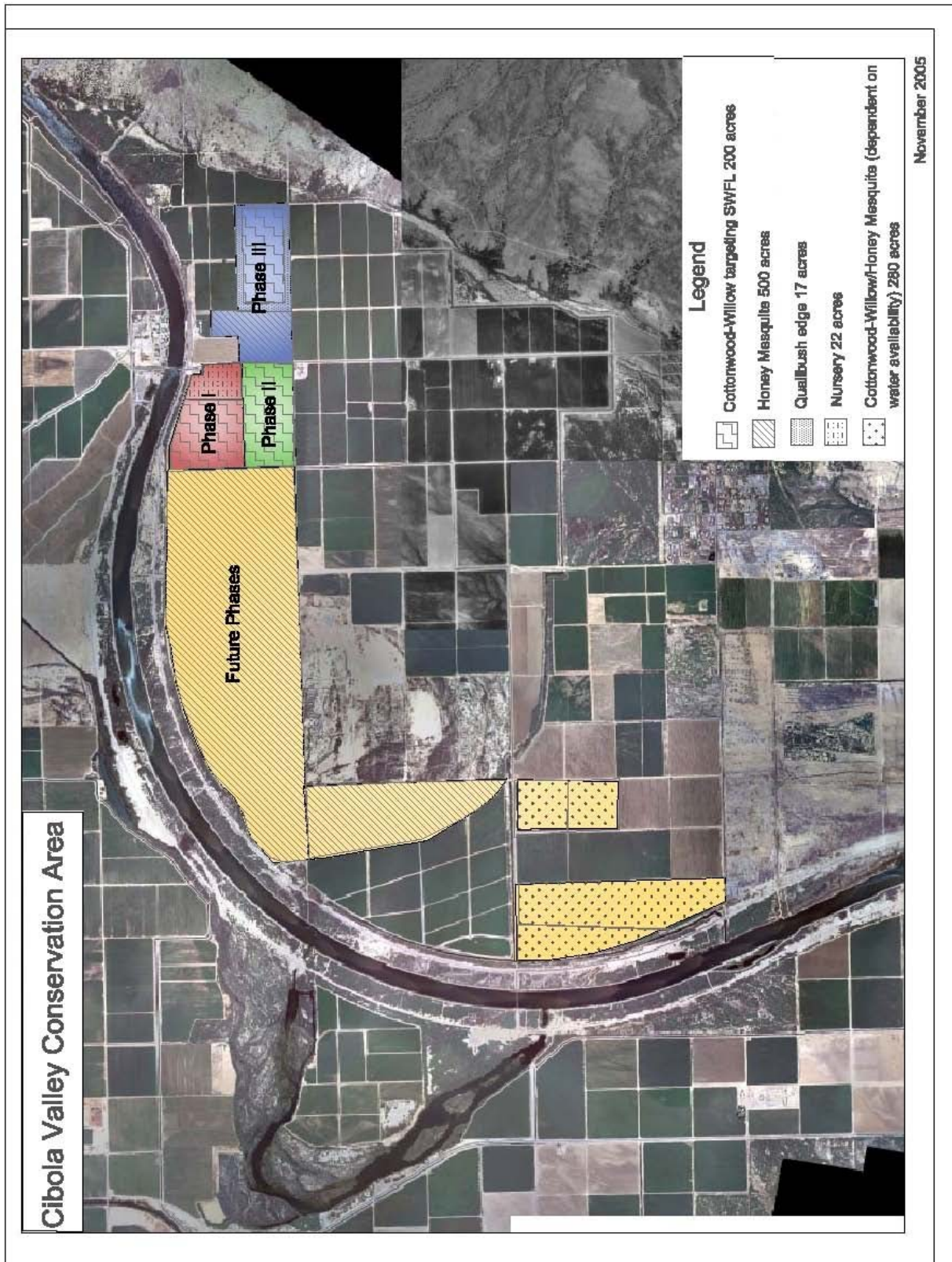
Honey Mesquite

- Mimic the historical landscape patterns of plant communities along the LCR and to create an integrated mosaic of habitats;
- Irrigate to water and establish planted mesquite seedlings;
- Limit establishment of saltcedar and other nonnative species to maintain habitat quality for associated Covered Species;
- Create high-quality habitat for targeted Covered Species;
- Create mounds and depressions to the extent necessary to establish some topographic diversity that will also provide habitat diversity by increasing plant and insect prey species diversity; and/or

- Plant with quailbush to create the honey mesquite–quailbush interface that provides habitat for the MacNeill’s sootywing skipper.

Other vegetation types may be integrated into designs to provide buffers from adjacent agricultural fields and future municipal and industrial development.

Figure 2. Conceptual Design



Description of Phases

Targeted Covered Species habitat would be established with the phased creation and management of each land cover type habitat. A plan would be produced for each phase identifying the land cover types to be created and the targeted Covered Species to determine the design and management practices. Specific planting, management, and monitoring plans would be included for each phase. Phases I and II would establish a native plant nursery and a cottonwood-willow block to be managed for southwestern willow flycatcher, totaling about 164 acres; i.e., 22 acres of nursery and 144 acres of habitat. Phase III would create another block of cottonwood-willow and a block of honey mesquite, totaling about 70 acres of southwestern willow flycatcher habitat and 60 acres of habitat for other targeted Covered Species. Subsequent phases would create Covered Species habitat and stabilize the remaining acreage. Any habitat created would take into account factors including, but not limited to, availability of water, habitat mitigation credit needs of the LCR MSCP, and the costs to implement any future phases and maintain the site.

Phase I

This phase is designed to create approximately 86 acres of cottonwood-willow habitat. Approximately 22 acres would be established initially as an on-site native plant nursery and managed for habitat after more nurseries have been developed for the LCR MSCP. The remaining 64 acres is designed to mimic native vegetation composition observed in occupied southwestern willow flycatcher habitat (Olson personal communication 2005, Raulston personal communication 2005). Both areas could be planted as early as March 2006. The existing agricultural fields would be laser-leveled with a 1 to 2% slope to ensure an even distribution of irrigation water. No additional grading changes would be part of the Phase I design.

The draft *Phase I Planting, Management, and Monitoring Plan* is expected to be available in Spring 2006. That document would:

- Summarize the conceptual design;
- Describe the Phase I development and implementation rationale;
- Delineate specific acreage, targeted Covered Species, cost estimates, and applicable AMMs, CMMs, MRMs, and Species-Specific Conservation Measures;
- Provide the Phase I-specific planting plans for the nursery and cottonwood-willow habitat;
- Provide the Phase I-specific management plan; and
- Provide the Phase I-specific monitoring plan.

Phase II

Implementation of Phase II could begin as early as FY07 and would expand upon the methodologies tested in Phase I. Further water delivery and retention methods to create

and sustain moist soils in cottonwood-willow habitat may be tested and possible refinements of the methodologies examined in the Phase I may be implemented, depending on the results and analysis of that study.

A draft *Phase II Planting, Management, and Monitoring Plan* is anticipated to be available in 2006. That document would:

- Summarize the conceptual design and any Phase I accomplishments;
- Describe the Phase II development and implementation rationale;
- Delineate specific acreage, targeted Covered Species, cost estimates, and applicable AMMs, CMMs, MRMs, and Species-Specific Conservation Measures;
- Provide a Phase II-specific planting plan for cottonwood-willow habitat;
- Provide a management plan that includes Phase II-specific management activities revisions and/or refinements to Phase I management activities, as indicated by the AMP; and
- Provide a monitoring plan that includes Phase II-specific monitoring activities revisions and/or refinements to Phase I monitoring activities, as indicated by the AMP.

Phase III

Implementation of Phase III could begin as early as FY08, and would expand and refine the methodologies tested in Phases I and II. The draft *Phase III Planting, Management, and Monitoring Plan* is anticipated to be available in 2007. That document would:

- Summarize the conceptual design and any Phases I and II accomplishments;
- Describe the Phase III development and implementation rationale;
- Delineate specific acreage, targeted Covered Species, cost estimates, and applicable AMMs, CMMs, MRMs, and Species-Specific Conservation Measures;
- Provide a Phase III-specific planting plan for cottonwood-willow habitat;
- Provide a management plan that includes Phase III-specific management activities revisions and/or refinements to Phases I and II management activities, as indicated by the AMP; and
- Provide a monitoring plan that includes Phase III-specific monitoring activities revisions and/or refinements to Phases I and II monitoring activities, as indicated by the AMP.

Future Phases

At full development, CVCA would consist of between 500 and 1,019 acres of an integrated mosaic of native land cover type habitats, with an emphasis on establishing as much southwestern willow flycatcher habitat as possible.

Schedule

2001 Biological Opinion Commitment Obligation (subsumed by LCR MSCP)

FY06

Phase I

Winter-Spring	Conduct pre-restoration monitoring
March	Plant 22 acres of cottonwood willow nursery
March	Plant 64 acres of cottonwood-willow habitat
Spring	Draft Phase I plan
March-October	Conduct post-restoration monitoring

Phase II

Spring-October	Conduct pre-monitoring
Summer	Complete Phase II design and planting plan

FY07

Phase I

February	Complete Phase I plan
March-October	Conduct post-restoration monitoring

Phase II

October-Spring	Conduct pre-restoration monitoring
February	Complete Phase II management plan
March	Plant 10 acres of mesquite nursery
March	Plant 70 acres of cottonwood-willow habitat
March-October	Conduct post-restoration monitoring

Phase III

October-Spring	Conduct pre-monitoring
Spring	Complete Phase III design and planting plan

FY08

Phase III

October-Spring	Conduct pre-monitoring
February	Complete Phase III management plan
March	Plant 75 acres of cottonwood-willow habitat
March	Plant 5 acres of native vegetation buffer
March	Plant 50 acres of honey mesquite
March-October	Conduct post-restoration monitoring

Remaining LCR MSCP Commitment

FY07

Spring	Identify Phases IV and V for FY09 and FY10, as appropriate
Summer	Complete Phases IV and V conceptual designs, as appropriate

FY08

Spring	Identify future development
Summer	Complete conceptual designs

3.0 Site Management Overview

Land Manager

The land manager would be responsible for the long-term management, operation, and maintenance of CVCA throughout the 50-year term of the LCR MSCP. A partnership with AGFD would ensure high quality habitat management for threatened, endangered, and other Covered Species. AGFD is familiar with managing these types of resources in Arizona.

Specific management methods, techniques, and/or agreements would be addressed in each phase-specific management plan. The management plan would include elements such as habitat objectives, monitoring requirements, land cover type management, targeted Covered Species habitat management, infrastructure maintenance, water management, wildfire management, noxious weed control, and pesticide use. Specific land cover type management activities would be further developed for each phase as the vegetation approaches a stage that indicates it is successfully established and would also consider the overall accomplishments and goals of the LCR MSCP at that time.

Land Cover Type Habitat Management

It is assumed that successful creation of the cottonwood-willow land cover type requires that the physical processes which determine habitat structure and dynamics in riparian systems be mimicked as much as possible. As a part of the initial implementation of the LCR MSCP, specific habitat objectives, design, and management criteria are in the process of being developed. CVCA-specific habitat management activities would be developed after those criteria have been adopted. The draft habitat objectives, design, and management criteria is being drafted, will be reviewed by a technical group, and presented to the Steering Committee in Spring 2006. Until these criteria are adopted, the following methods have been developed as a management starting point.

Cottonwood-Willow

Structural Management

Method 1—Manage structure to maintain the seral stages preferred by targeted Covered Species.

Management activities may include techniques such as apical pruning and selective dormant cuttings and pole harvesting.

Water Management

Method 1—Irrigate in the appropriate seasons to temporally provide moist soil surfaces during the natural seed dispersal period to create favorable conditions for vegetation survival and regeneration.

Soil moisture and other site conditions monitoring and observation would provide the data necessary to determine an appropriate irrigation schedule.

Method 2—Irrigate during breeding season (May through September) to create moist soil conditions for the southwestern willow flycatcher.

Soil moisture monitoring would provide the data needed to irrigate accordingly. Variable climate conditions require a “real-time” approach. On sites that do not easily retain moist soils, techniques to improve retention may include scattered preformed pool-like structures, rubber liners, and/or soil amendments.

Soils Management

Method 1—Irrigate to leach soils and prevent buildup of salts.

Salinity monitoring would provide the data needed to irrigate accordingly.

Honey Mesquite

Structural Management

Method 1—Manage structure to achieve essential habitat parameters of honey mesquite III for targeted Covered Species.

The trees would be densely planted and allowed to self-thin. Minimal irrigation once the trees were established would discourage the conditions that favor the development of a dense exotic understory as the trees grow to maturity and achieve the honey mesquite III structure type. Vegetation monitoring would provide the data needed to determine if less than 90% of the trees on the site were honey mesquite. In that case, the site would be replanted to achieve greater than 90% composition.

Water Management

Method 1—Irrigate in the appropriate seasons to temporally provide moist soil surfaces during the natural seed dispersal period to create favorable conditions for vegetation survival and regeneration.

Soil moisture and other site conditions monitoring and observation would provide the data necessary to determine an appropriate irrigation schedule.

Soils Management

Method 1—Irrigate to leach soils and prevent buildup of salts in the soil.

Salinity monitoring would provide the data needed to irrigate accordingly.

Other Management Needs

Law Enforcement

Goal 1—Appropriate agencies would patrol CVCA regularly by land and river to enforce all applicable laws.

Specific agreements and/or methods would be addressed in each phase-specific design and management plan.

Health and Safety

Goal 1—Protect the public from vector-borne diseases.

Some subspecies of mosquitoes and other insects can act as vectors for various diseases; e.g., encephalitis, West Nile virus. The Arizona Office of Infectious Disease Services identified West Nile virus in the State in 2003. In 2005, 102 known cases were reported, with only one of those cases occurring in east La Paz County.

Buffer areas would be designed bordering cottonwood-willow land cover type habitats managed for moist soil conditions to produce prey insect populations. On-site workers would follow the most current National Institute for Occupational Safety and Health guidelines for outdoor and field workers.

Specific agreements and/or methods would be addressed in each phase-specific design and management plan.

Noxious Weed Control and Pesticide Use

Goal 1—Control exotic plant species; e.g., saltcedar.

The AMP would provide data to determine a threshold of exotics infestation that exceeds the percentage tolerable in a high-quality habitat.

All pest control operations utilizing pesticides should be undertaken under the supervision of a Certified Pesticide Applicator and should comply with all Federal, State, and local Regulations.

All pesticide application records and associated documentation would be stored by the land manager and should include:

- *Arizona Request for Pesticide Application* form,
- Pesticide use records,
- Training records for all employees handling pesticides,
- La Paz County Agricultural Use Permit,
- Pesticide Material Safety Data Sheets, and
- Location Map of pesticide storage site or facilities.

Specific agreements and/or methods would be addressed in each phase-specific design and management plan.

Wildfire Management Plan

As guided by commitments in the HCP (LCR MSCP 2004b), wildfire management practices on CVCA would:

- Reduce the risk of the loss of created habitat to wildfire by providing resources to suppress wildfires, e.g., contributing to and integrating with local, State, and Federal agency fire management plans;
- Incorporate designs to contain wildfire and facilitate rapid response to suppress fires, e.g., fire management plans would be an element of each conservation area management plan; and
- Implement land management and habitat creation measures to support the reestablishment of native vegetation that is lost to wildfire.

Specific agreements and/or methods would be addressed in each phase-specific design and management plan.

4.0 Monitoring Plan Overview

Monitoring of the created conservation areas is critical to the AMP. This process allows the LCR MSCP to analyze implementation activities, address the uncertainty inherent in a 50-year program, and respond appropriately. Scientifically-designed monitoring studies would be conducted to evaluate if the restoration parameters established for each Covered Species habitat were being achieved, if the conservation area develops as Covered Species habitat, and if the habitat is being utilized by the Covered Species. The AMMs, CMMs, MRMs, and General and Species-Specific Conservation Measures summarized previously in Table 1 would dictate the range of data collected, analyzed, and incorporated into the AMP. Results reported on how the created habitat develops relative to the restoration and management techniques employed would be used to refine and/or develop future techniques. This would ensure that the most cost-effective and efficient approaches were applied on the conservation area.

For the purposes of the LCR MSCP, initial conservation area monitoring plans would be based on elements described in the HCP (LCR MSCP 2004b). A document describing the science and AMP strategies for the LCR MSCP is in the process of being developed. The monitoring plan elements for CVCA may be revised after those strategies have been adopted.

Reference Conditions

For the purposes of the LCR MSCP, reference conditions would be defined based on the minimum habitat requirements to be achieved by created land cover types as described in the HCP (LCR MSCP 2004b). Reference conditions would be used as a benchmark for the ultimate goals of the conservation area. If known, reference conditions would further be refined based on the best available current knowledge of the targeted Covered Species habitat. As previously discussed, a document describing the criteria for specific habitat objectives, design, and land management for the LCR MSCP is in the process of being developed (see previous discussion in section heading “Land Cover Type Habitat Management” in section 3.0 *infra*). The reference conditions for CVCA may be revised after those criteria have been adopted.

As each CVCA phase design is developed, reference conditions would be defined for that particular phase. Cottonwood-willow land cover types I, II, III, and IV would follow the reference conditions either as defined in Phase I for southwestern willow flycatcher habitat; i.e., moist surface soil conditions during the breeding season, minimum patch size, canopy height, canopy closure, vertical foliage density, mean soil moisture (%)

volume), mean diurnal temperature, mean maximum diurnal temperature, mean diurnal relative humidity (Koronkiewicz et al. 2004, LCR MSCP 2004b); or other targeted Covered Species habitats (LCR MSCP 2004b). The HCP describes the minimum requirements for honey mesquite III (LCR MSCP 2004b). Other reference conditions may refer to habitat for Covered Species such as the western red bat, western yellow bat, yellow-billed cuckoo, elf owl, gilded flicker, Gila woodpecker, vermilion flycatcher, Arizona Bell's vireo, Sonoran yellow warbler, summer tanager, and/or MacNeill's sootywing skipper (LCR MSCP 2004b).

Implementation and Effectiveness Monitoring Goals

Two types of monitoring would be conducted on CVCA, implementation and effectiveness. The following monitoring goals were formulated based the conceptual design. These goals may be revised depending on the AMP results and/or management decisions in the future.

Implementation Monitoring

Implementation monitoring would be conducted to assess whether or not land cover type creation and management actions have been implemented as designed on each phase. This type of monitoring quantifies changes immediately after treatments and evaluates whether actions were implemented as prescribed (Block et al. 2001). For example, this type of monitoring would be used to determine if the planting techniques employed were effective and if the vegetation was planted according to the phase design specifications.

Implementation monitoring would:

- Determine if the appropriate number of acres of specific created land cover type has been achieved in accordance with each phase's design;
- Determine the survival rate, composition, and distribution of trees planted;
- Determine if varied planting designs and techniques produce different habitat parameters, e.g., canopy cover and tree densities;
- Determine the amount of water in acre-feet utilized per acre during each year, and to determine if the appropriate watering regime was achieved depending on land cover type, as defined by conservation area goals, e.g., number of acre-feet of water was placed on willow versus cottonwood versus mesquite; and
- Determine contaminant loads for return irrigation flows to the LCR.

Effectiveness Monitoring

Effectiveness monitoring would be conducted to determine whether each phase has achieved the reference conditions (see previous discussion in section heading "Reference

Conditions” in section 4.0 *infra*) and to determine any Covered Species use of that habitat (Block et al. 2001).

Effectiveness monitoring would follow the species-specific conservation measures and would:

- Determine if the land cover types for other targeted Covered Species has developed into habitat, as determined by the reference conditions;
- Determine if created land cover type habitat supports appropriate multiple layers, seral stages, and age cohorts of trees;
- Determine if the habitat is being utilized by targeted or other Covered Species; and
- Determine if there were differences in wildlife use of the habitat depending on planting design and composition, and watering regimes.

Monitoring Analysis and Evaluation

Once the implementation and effectiveness monitoring data were analyzed, the results would be evaluated using two sets of management guidance criteria; thresholds and trigger points. These criteria would be used to evaluate all phases of implementation.

Thresholds

Thresholds signal that conditions are appropriate and to continue current management practices. The thresholds would be:

- Microclimate and vegetation conditions have been achieved for reference conditions,
- Site is being utilized by one or more Covered Species during migration,
- Site is being utilized by one or more Covered Species during breeding,
- Site is being utilized by southwestern willow flycatcher and/or other targeted Covered Species during migration, and/or
- Site is being utilized by southwestern willow flycatcher and/or other targeted Covered Species during breeding.

In addition, if any monitoring activities documented that the southwestern willow flycatcher was occupying the site before reference conditions were achieved, management and maintenance activities would be adjusted, as appropriate.

Trigger Points

Trigger points signal the need to alter current management activities to achieve the conservation area goals of the restoration site or change goals for site. The trigger points would be:

- Reference conditions for vegetation and microclimate conditions have not been achieved,
- Previously suitable land cover type structure is no longer suitable for any of the targeted Covered Species,
- Soil salinity increases to thresholds above targeted plant tolerances,
- Contaminant loads in return irrigation flows exceed those defined in the reference conditions, and/or
- Targeted Covered Species habitat needs exceed water availability.

Resources

Population and habitat resources would be determined based on the appropriate AMMs, MRMs, and General and Species-Specific Conservation Measures, and monitoring would be conducted both pre- and post-restoration. Post-restoration monitoring would only be conducted for select resources if the existing agricultural fields were unlikely to support populations of targeted Covered Species prior to development; e.g., southwestern willow flycatcher has never been found to occupy cotton fields. In most cases, the resources monitoring would focus on guilds of species for efficiency. The pre- and post-restoration resources that would be monitored are summarized below.

Pre-Restoration

Pre-restoration surveys and monitoring would identify the baseline and controls for post-restoration monitoring. The data would be compared to a long-term control site at CVCA, post-restoration data for each specific phase, and at other restoration sites implemented as part of the LCR MSCP. Specific protocols for each resource would be included in each phase-specific monitoring plan.

Vegetation

A qualitative overall description of type of vegetation in each agricultural field would be described before planting.

Soil Salinity

Baseline salinity levels in each irrigated field would be determined by obtaining soil salinity samples which would be collected after existing crops have been harvested and the field has been disked, and prior to planting native vegetation. Depth to groundwater would also be measured.

Water Quality

Water quality sampling may be conducted at the CVIDD drain outflow into the LCR to determine if there is an increase in contaminant loads for return irrigation flows. The samples would be collected to establish a baseline and during the implementation of each phase, as needed. Samples may be analyzed for organophosphates, organics, and/or other pesticides/herbicides that would be utilized in the planting and management of the conservation area.

Microclimate

If any Covered Species were found during pre-restoration surveys, microclimate monitoring would be conducted to measure temperature/relative humidity using HOBO[®] temperature/relative humidity data loggers.

Small Mammals

Presence/absence transects would be conducted prior to the implementation of that phase and/or until implementation of that phase begins. Preliminary presence/absence surveys would be conducted for each phase during Fall, Winter, and Spring to reduce the likelihood of heat stress to captured wildlife. The presence/absence studies would also be conducted in the control area.

Bats

Preliminary presence/absence bat surveys may be conducted utilizing site-appropriate stationary AnaBat[®] systems or complete active/passive AnaBat[®] surveys during Spring, Summer, Winter, and Fall. Monitoring would be conducted prior to the implementation of each phase.

Neotropical Birds

A standardized point count protocol established by Great Basin Bird Observatory (GBBO 2003) would be used to monitor avian use. Point counts would be conducted during breeding season (May through July) for breeding Covered Species prior to the implementation of each phase. Sample transects would be randomly selected within each phase. The number of sample transects would be determined based on the total acreage of each phase and would traverse all land cover types planned for that phase. Area searches and/or migration and winter banding may be conducted to determine winter resident bird

species, depending on the targeted Covered Species habitat to be created and the potential for Covered Species to inhabit these areas during migration and winter months.

MacNeill's Sootywing Skipper

Presence/absence surveys may be conducted prior to the implementation of each phase and/or until implementation of that phase begins. Spring, Summer, and Fall surveys may be conducted to determine areas of suitable habitat. The presence/absence surveys may also be conducted in the control area.

Post-Restoration

Post-restoration data would be compared and contrasted to pre-restoration data, the long-term control area, the existing habitat data for targeted Covered Species, and to other restoration sites implemented as part of the LCR MSCP. Specific protocols for each resource would be included in each phase-specific monitoring plan.

Vegetation

For each phase of implementation, each land cover type planted in that phase would be monitored to determine vegetation survival. Initial success monitoring would consider survival during establishment, to determine if mortality within the first growing season may be due to implementation-related factors; e.g., planting shock, seed viability, water availability, soil conditions, exotics competition. During the first two growing seasons, growth and survivorship would be sampled utilizing transects through each phase. Sample transects would be randomly determined on an annual basis. The number of sample transects would be determined for each phase and would be based on several factors including patch size, restoration technique, vegetation species, and variation within each stand. Beginning at the end of the third growing season, habitat condition would be monitored using a standardized protocol based on a nested sample plot design.

Soil Salinity

Salinity levels in each irrigated field would be determined by obtaining soil salinity samples. Data would be compared to the baseline established by pre-restoration monitoring.

Water Quality

Water quality sampling would be conducted at the CVIDD drain outflow into the LCR. Samples may be analyzed for organophosphates, organics, and other pesticides/herbicides that would be utilized in the management of the conservation area.

Microclimate

Microclimate conditions of temperature, relative humidity, and soil moisture would be recorded utilizing HOBO[®] data loggers and soil moisture probes. After planting data loggers would be placed either randomly or in a stratified design within each phase. A stratified design would be used to determine differences in microclimate depending on the distance from an irrigation point. In the event that the remote loggers were not functioning, handheld soil moisture probes may be used to obtain data. Post-restoration monitoring data would be compared with data collected from targeted Covered Species habitats, if known.

Small Mammals

Small mammal presence/absence surveys utilizing the same protocols as pre-restoration surveys would be conducted in the same locations for direct comparison. If pre-restoration surveys were not conducted, transects would be established in post-restoration sites.

Bats

Bat presence/absence surveys may be conducted in the same areas and utilize the same protocols as the pre-restoration surveys. Stationary AnaBat[®]/Sonabat[®] systems may be after the second growing season if the site offers adequate protection of the systems. If indicated, targeted Covered Species bat surveys may be conducted.

Neotropical Birds

A standardized point count protocol established by Great Basin Bird Observatory (GBBO 2003) would be used to monitor avian use. Point counts would be conducted during breeding season (May through July) for breeding avian Covered Species. Point counts would be conducted utilizing the same protocols as pre-restoration monitoring and at same locations for direct comparison. If pre-restoration point counts were not initiated due to time constraints, the point counts would be set up in post-restoration monitoring sites. Comparisons would be to other pre- and post-restoration sites, in addition to the control site.

Southwestern Willow Flycatcher

Southwestern willow flycatcher presence/absence surveys would be conducted after at least two growing seasons, depending on when the land cover type structure and density indicates the habitat has achieved the reference conditions. Surveys would be conducted utilizing the minimum 5-survey protocol approved by the U.S. Fish and Wildlife Service (Sogge et al. 1997, USFWS 2000). If this Covered Species is detected after June 15th, nest searches would be conducted to determine breeding status and use of habitat. If breeding populations of more than 10 birds were established, banding may be conducted for long-term use of site and refinement of habitat use. Data collected at this site would be compared with other life history studies being conducted along the LCR.

Yellow-Billed Cuckoo

Yellow-billed cuckoo presence/absence surveys would be conducted after three to five growing seasons, depending on when the land cover type structure and density indicates the habitat has achieved the reference conditions. If this Covered Species is detected during the breeding season, nest searches would be conducted.

MacNeill's Sootywing Skipper

Presence/absence surveys may be conducted in post-restoration sites targeted for MacNeill's sootywing skipper habitat. Spring, Summer, and Fall surveys may be conducted to determine areas of suitable habitat.

Sampling Design

Sampling designs would be based on quasi-experimental design using the "Before-After-Control-Impact" (BACI) approach (Green 1979, Bernstein and Zalenski 1983, Stewart-Oaten and Osenberg 1992). The BACI approach prescribes the collection of data prior to an activity and comparison to data collected after the activity (Smith 2002). The quasi-experimental design would use pre-restoration phases as controls, along with long-term control area. The designs would utilize randomization where possible. Sub-samples of each phase would be taken at the same or similar randomized points both pre- and post-restoration. Control areas and each implemented phase would be monitored during same or similar time periods. To the greatest extent practicable, pre-restoration monitoring would be conducted for a minimum of one year prior to the implementation of each phase.

Data Collection and Analysis

All data collected would be entered into the long-term relational database that is in the process of development for the LCR MSCP. Analysis would be both qualitative and quantitative, depending on the data collected.

For vegetation, a summary of vegetation and habitat characteristics would be produced for pre- and post-restoration. Reference variables for vegetation and microclimate would be compared using the appropriate statistical analysis such as ANOVA and Tukey's multiple comparison tests, similar to those found in McLeod et al. (2005).

Soil salinity and water quality analyses would be compared on an annual basis to determine if trigger points have been reached.

Southwestern willow flycatcher surveys would record if any of these birds were found utilizing the site. If they were documented during breeding season, nest monitoring would be conducted to confirm nesting. If nesting is confirmed, similar variables to current life

history studies would be collected and analyzed according to current methodology being conducted by SWCA Environmental Consultants (McLeod et al. 2005).

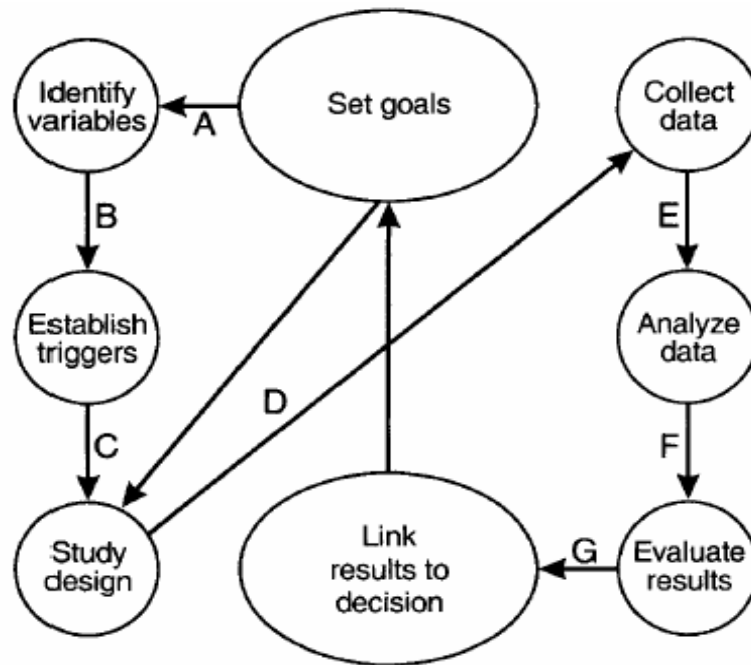
For avian point counts, all data would be recorded on standardized data forms utilizing the Great Basin Bird Observatory template. Data would be compiled and single factor ANOVA would be used for detection between survey dates. Species diversity, richness, and evenness would be determined using a natural logarithm version (Nur et al. 1999) of Shannon's Index (Krebs 1989).

The analyses methods for small mammals, bats, and MacNeill's sootywing skipper would be determined pending the finalization of the protocols for each type of resource monitoring. All would contain a list of species present and would compare species diversity and richness for both pre- and post-restoration.

Evaluation of Results and the Adaptive Management Program

Data would be evaluated yearly to determine if thresholds and/or trigger points were reached. If results indicate that restoration activities meet or exceed thresholds, recommendations would be made in the annual report for future management actions. If results indicate that effects were deleterious to species and/or habitats, recommendations on prescriptions and modifications would be identified and other methods to be tested. All data and recommendations flow into the AMP. Figure 3 presents a flow diagram of steps involved with monitoring and feedback into an AMP. The capital letters indicate feedback points when monitoring methods and results would be evaluated (Block et al. 2001).

Figure 3. Adaptive Management Process



5.0 Summary

It is Reclamation's preliminary assessment that the CVCA presents a good opportunity to establish substantial blocks of habitat for the LCR MSCP. With the cooperation of the current and future partners, it is anticipated that this site could contribute between 500 and 1,019 acres of land cover types managed for targeted Covered Species. It would also provide the opportunity to accomplish large-scale demonstrations of restoration, management, and monitoring methods and techniques. Through the AMP, cost-effective and efficient habitat creation can be accomplished on this conservation area and the knowledge gained can also be applied to other LCR MSCP conservation areas.

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